



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/648,627	08/25/2003	Manish Chandhok	10559-839001 / Intel P167	4364
20985	7590	10/20/2004	EXAMINER	
FISH & RICHARDSON, PC 12390 EL CAMINO REAL SAN DIEGO, CA 92130-2081			STOCK JR, GORDON J	
			ART UNIT	PAPER NUMBER
			2877	

DATE MAILED: 10/20/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/648,627

Applicant(s)

CHANDHOK, MANISH

Examiner

Gordon J Stock

Art Unit

2877



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 28 July 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-46 is/are pending in the application.
- 4a) Of the above claim(s) 16-27 is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-3, 5-15 and 28-46 is/are rejected.
- 7) ☒ Claim(s) 4 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☒ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 25 August 2003 is/are: a) ☐ accepted or b) ☒ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date 20030825.
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____.
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____.

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of invention I in the reply filed on July 28, 2004 is acknowledged.

2. **Claims 16-27** are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected invention, there being no allowable generic or linking claim.

Election was made **without** traverse in the reply filed on July 28, 2004.

Drawings and Specification

3. **Figure 1** should be designated by a legend such as --Prior Art-- because only that which is old is illustrated. See MPEP § 608.02(g). Corrected drawings in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.121(d)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

4. The drawings are objected to as failing to comply with 37 CFR 1.84(p)(5) because they do not include the following reference sign(s) mentioned in the description: **520a of Fig. 5; 455 of Fig. 4**. And on **Fig. 3**, the computer should be coupled to the wafer stage as stated in paragraph 0037. And the drawings and specification are objected to as failing to comply with 37 CFR 1.84(p)(5) because they include the following reference character(s) not mentioned in the description: **510B of Fig. 5; 115 of Fig. 1**. Corrected drawing sheets in compliance with 37 CFR 1.121(d) and/or amendment to the specification to add the reference character(s) in the

Art Unit: 2877

description in compliance with 37 CFR 1.121(b) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The replacement sheet(s) should be labeled "Replacement Sheet" in the page header (as per 37 CFR 1.84(c)) so as not to obstruct any portion of the drawing figures. If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

5. The abstract is objected to for the following: the term '10307651.doc' on the last line should be cancelled. Correction is required.

6. The specification is objected to for the following: on line 4 of page 4 'detector 270' should read -detector 370-; on page 12 lines 2-3, the step does not correspond with 440; in paragraph 0042 lines 1-2 the step does not correspond with 445 and on lines 3-4 the step does not correspond with 450 and on lines 4-5 the step does not correspond with 455. Corrections to specification and/or Fig. 4 required.

Claim Rejections - 35 USC § 112

7. The following is a quotation of the second paragraph of 35 U.S.C. 112:

The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

8. **Claim 15** is rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Art Unit: 2877

9. The term "substantially smaller" in **claim 15** is a relative term which renders the claim indefinite. The term "substantially smaller" is not defined by the claim, the specification does not provide a standard for ascertaining the requisite degree, and one of ordinary skill in the art would not be reasonably apprised of the scope of the invention. "Substantially smaller" makes the wavelength of the exposure light indefinite.

Claim Rejections - 35 USC § 102

10. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

A person shall be entitled to a patent unless –

(b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

11. **Claims 1-3, 5-12** are rejected under 35 U.S.C. 102(b) as being anticipated by **Nomura et al. (4,828,392)**.

As for **claims 1-3 and 5-12**, Nomura in an exposure apparatus discloses the following: generating alignment light to align a wafer (Fig. 1: 26) with an imaging plate, reticle (Fig. 1: 20); modifying the alignment light using an alignment phase grating (Fig. 2: 34Y) having a first pitch (col. 5, lines 15-20); further modifying the alignment light at a pupil plane, a Fourier transformation plane, to have an intensity periodicity of less than the first pitch at the wafer plane, half the pitch (col. 5, lines 30-65); the alignment light is transmitted through the grating (Fig. 1: at 34); reflecting a reflected portion of the alignment light from an alignment pattern on a wafer at the wafer plane, the alignment pattern having a second pitch less than the first pitch, an integer of the times the fringe pitch such as an integer of '1' (col. 5, lines 55-67; and Fig. 5 with reflected portions); receiving at least a portion of the reflected portion of the light in a detector

Art Unit: 2877

(Fig. 5: D and M); determining an alignment characteristic and changing wafer position and determining alignment position based on determination (col. 9, lines 20-35); blocking a central maximum of the alignment light at the pupil plane, Fourier transformation plane, and allowing unblocked light including a first order maximum of the alignment light to pass (col. 5, lines 34-38) using a pupil filter, a spatial filter (Fig. 1: 28); moving the pupil filter, spatial filter, to a position not in a light path between the reticle and wafer for exposure (col. 9, lines 32-35).

Claim Rejections - 35 USC § 103

12. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

13. **Claim 13** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Nomura et al. (4,828,392)**.

As for claim 13, Nomura discloses everything as above (see claim 12). In addition, he discloses generating patterning light to pattern the wafer; modifying the light through the circuit pattern on the reticle; and exposing the wafer (col. 9, lines 20-40). He is silent concerning a resist layer. However, it is well known in the art that resist layers are exposed on wafer substrates in order to produce a circuit pattern on the wafer. Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made that the exposure step comprised exposing a resist layer, for a circuit pattern is produced on a wafer through exposing a resist layer on the wafer substrate.

14. **Claims 14-15** is rejected under 35 U.S.C. 103(a) as being unpatentable over **Nomura et al. (4,828,392)** in view of the applicant's disclosure of prior art.

As for **claims 14-15**, Nomura discloses everything as above (see claim 13). He is silent concerning the exposure and alignment wavelengths being different; whereas, the exposure wavelength is smaller than the alignment wavelength. However, the applicant's disclosure of background art teaches that alignment wavelengths are different than and are larger than exposure wavelengths in order to prevent unwanted exposure during alignment and to prevent over absorption during alignment (page 3, paragraph 0008). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have a separate exposure wavelength smaller than the alignment wavelength in order to prevent exposure during alignment and subsequent over absorption during alignment.

15. **Claims 28-41, 45, 46** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Nomura et al. (4,828,392)** in view of the applicant's disclosure of prior art.

As for **claims 28-30, 34-38, 45, 46** Nomura discloses the following: a reduction projection alignment exposure apparatus with a numerical aperture (col. 1, lines 25-35; col. 4, lines 10-13); an imaging plate, a reticle, with alignment phase grating (Fig. 1: 20; Fig. 2: 34Y); a pupil filter, a spatial filter positioned in a pupil plane, Fourier transformation plane, to make intensity periodicity one half of period of alignment grating (Fig. 1: 28; col. 5, lines 45-65); a wafer having an alignment pattern with a pitch equal to I when the period of grating has an integer of '1' times the fringe pitch (col. 5, lines 65-67; col. 6, lines 1-10); and wafer pattern reflects portion of light (Fig. 5); the spatial filter is a central obscuration to block zeroth order light and allow first order light to transmit (col. 5, lines 30-40); a wafer stage (col. 4, lines 49-

Art Unit: 2877

50); a lens positioned between the reticle and the pupil plane, Fourier transformation plane (Fig. 1: 22); a lens positioned between the pupil plane, Fourier transformation plane, and the wafer (Fig. 1: 22a); a detector and a mirror to direct at least some of reflected portion to detector (Fig. 5: A and M); a characteristic is intensity (col. 6, lines 8-10); a characteristic is an interference pattern (col. 5, lines 40-45); a light source to produce light having a wavelength (Fig. 1: 12). As for the pitch being equal to λ/NA . Nomura is silent. However, applicant's disclosure of prior art teaches that the pitch for the alignment grating must be at least λ/NA to be at the resolution limit (page 3, paragraph 0009). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the pitch of the alignment grating be at least λ/NA in order for the system to be at the resolution limit.

As for **claims 31-32**, Nomura in view of applicant's disclosure of prior art discloses everything as above (see claim 28). Nomura is silent concerning the intensity pitch being equal to or about $\lambda/2NA$. However, Nomura in view of applicant's disclosure has the alignment grating pitch being λ/NA and Nomura has the intensity pitch half of the alignment grating's pitch (equation 6). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made that the intensity pitch is equal or about $\lambda/2NA$, for the intensity pitch is half of the alignment grating pitch.

As for **claim 33**, Nomura in view of applicant's disclosure of prior art discloses everything as above (see **claim 28**). Nomura is silent concerning 533nm or 632nm alignment wavelengths. However, applicant's disclosure of prior art teaches that typical alignment wavelengths are 533nm and 632nm (page 3 paragraph 0008). Therefore, it would be obvious to

Art Unit: 2877

one skilled in the art to have the system have alignment wavelengths of either 533nm and 632nm because wafers are typically aligned with reticles at wavelengths of 533nm and 632nm.

As for **claims 39-41**, Nomura in view of applicant's disclosure of prior art discloses everything as above (see **claim 38**). In addition, Nomura discloses a characteristic is intensity (col. 6, lines 8-10); a characteristic is an interference pattern (col. 5, lines 40-45); the detector provides a detector output related to a characteristic of the reflected portion (col. 6, lines 8-40). And data processing means (col. 2, lines 30-35).

16. **Claims 42-44** are rejected under 35 U.S.C. 103(a) as being unpatentable over **Nomura et al. (4,828,392)** in view of the applicant's disclosure of prior art further in view of **Ire et al. (6,118, 516)**.

As for **claims 42-44**, Nomura in view of the applicant's disclosure of prior art discloses everything as above (see **claim 39**). As for the wafer stage outputting a position of the wafer stage and the processing system receiving the wafer stage output and correlating the detector output with the wafer stage output, Nomura is silent. However, Ire in an exposure apparatus teaches a processing control system that receives stage output and detector output to correlate data for alignment/positioning of the wafer relative to the reticle (Fig. 24: 14-16, 139a, 139b, 17a, 18). Therefore, it would be obvious to one of ordinary skill in the art at the time the invention was made to have the system have the data processor receive both detector output and stage output to correlate the data in order to provide proper positioning/alignment of the wafer within the projection exposure apparatus.

Allowable Subject Matter

Art Unit: 2877

17. **Claim 4** is objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

As to **claim 4**, the prior art of record, taken alone or in combination, fails to disclose or render obvious in a method modifying the alignment light comprises reflecting light from the alignment grating, in combination with the rest of the limitations of **claim 4**.

Fax/Telephone Numbers

If the applicant wishes to send a fax dealing with either a proposed amendment or a discussion with a phone interview, then the fax should:

- 1) Contain either a statement "DRAFT" or "PROPOSED AMENDMENT" on the fax cover sheet; and
- 2) Should be unsigned by the attorney or agent.

This will ensure that it will not be entered into the case and will be forwarded to the examiner as quickly as possible.

Papers related to the application may be submitted to Group 2800 by Fax transmission. Papers should be faxed to Group 2800 via the PTO Fax machine located in Crystal Plaza 4. The form of such papers must conform to the notice published in the Official Gazette, 1096 OG 30 (November 15, 1989). The CP4 Fax Machine number is: (703) 872-9306

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Gordon J. Stock whose telephone number is (571) 272-2431.

The examiner can normally be reached on Monday-Friday, 10:00 a.m. - 6:30 p.m.

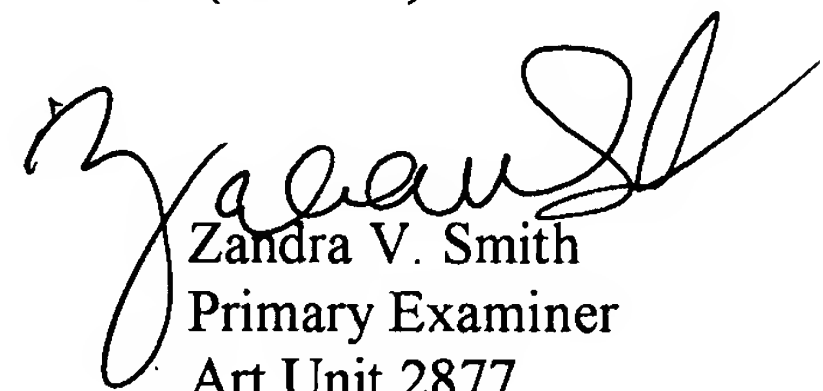
If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory J. Totaled, Jr., can be reached at 571-272-2800 ext 77.

Art Unit: 2877

Information regarding the status of an application may be obtained from the Patent Application information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private Pair system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).


gs

October 14, 2004


Zandra V. Smith
Primary Examiner
Art Unit 2877